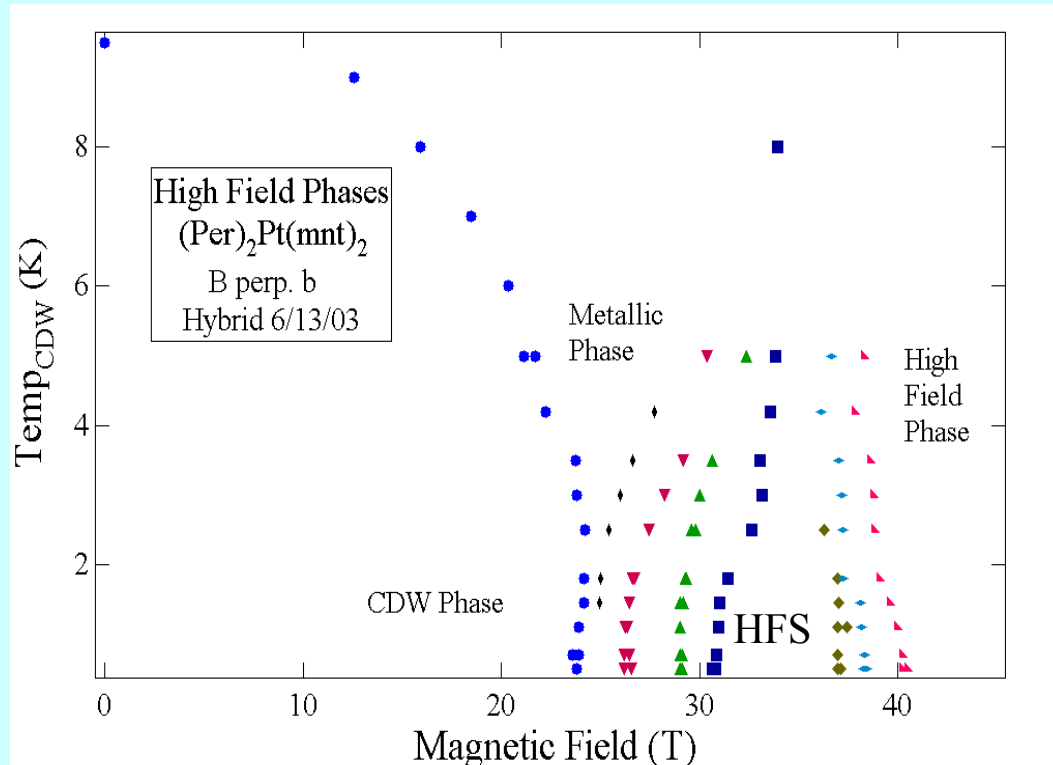


$(\text{Per})_2\text{Pt}(\text{mnt})_2$: Surprises above 30 T in one dimension

J. Brooks, Florida State University, NSF DMR-0203532

The title compound has a highly one dimensional electronic structure which forms a charge density wave (CDW) insulating phase below a transition temperature of $\sim 8\text{K}$. Conventional theory involving the Zeeman energy predicts a magnetic field will remove the CDW by 30 T, thereby producing a normal metal state. Using the Hybrid magnet at the NHMFL, we have not only confirmed this prediction, but we have found that the magnetic field induces a completely new state associated with the coupling of the orbital motion of the electrons with the magnetic field. This new electronic state was completely unexpected, based on the previous understanding of this material. Work is underway to quantify the thermodynamic signature of the high field state, and to determine the mechanism.



The T-B phase diagram of $(\text{Per})_2\text{Pt}(\text{mnt})_2$

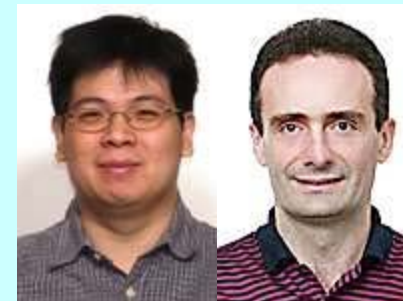
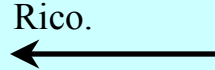
Magnetoresistance measurements in the Hybrid magnet to 45 tesla reveal a new high field state (HFS) beyond the CDW ground state, where a cascade of sub-phases appear.

Educational Outreach Programs

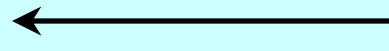
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Research Experience for Undergraduates (REU) participant, Mercedes Castaneda (left), works in the lab exploring the properties of conducting polymers. Her eight weeks of summer work at the NHMFL culminated in the presentation of her work to her colleagues and friends both at the NHMFL and back at her home institution at the Univ. Puerto Rico.



Eric Jobiliong and Relja Vasic, graduate students in the Molecular Materials group, volunteer their time for educational programs such as FSU's "Saturday Morning Physics" and the NHMFL Open House, as well as tutoring undergraduate physics students.



Graduate student, David Graf, works with 5th grade students at WT Moore Elementary School in Tallahassee. David is supported through an NSF GK-12 Fellowship. He spends about 10 hours per week in the classroom and 10 hours per week developing lessons and activities to explore magnetism, motion, forces and energy. David is the main driver of the $(\text{Per})_2\text{Pt}(\text{mnt})_2$ high field research project, supported through the NSF-DMR 0203532 grant.